CHAPTER 2

DESCRIPTION OF THE UPPER CLINCH RIVER WATERSHED

2.1. BACKGROUND.

The Clinch River and Watershed are named for one of the first explorers from the Transylvania Land Company to see the river. Dr. Thomas Walker, an explorer and Long Hunter, explored much of the Clinch River Valley in the 1760's. Originally called Pellisipi by Native Americans, the Clinch River originates in the mountains of Southwestern Virginia.

This Chapter describes the location and characteristics of the Upper Clinch River Watershed.

2.2. DESCRIPTION OF THE WATERSHED.

2.2.A. General Location. The Tennessee portion of the Upper Clinch River Watershed is located in East Tennessee and includes parts of Anderson, Campbell, Claiborne, Hancock, Grainger, Hawkins, and Union Counties.

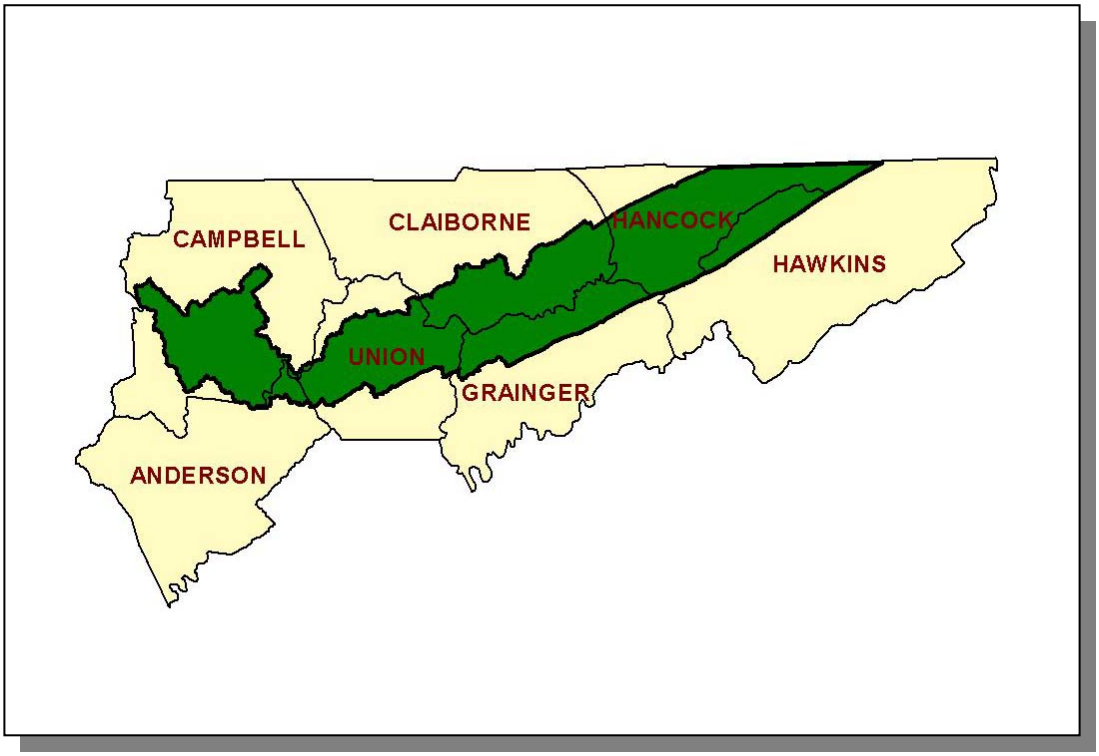


Figure 2-1. General Location of the Tennessee Portion of the Upper Clinch River Watershed.

COUNTY	% OF WATERSHED IN EACH COUNTY
Hancock	24.8
Campbell	19.8
Claiborne	18.6
Union	17.7
Grainger	11.7
Hawkins	5.9
Anderson	1.5

Table 2-1. The Tennessee Portion of the Upper Clinch River Watershed Includes Parts of Seven East Tennessee Counties.

2.2.B. Population Density Centers. Thirteen highways serve the major communities in the Tennessee portion of the Upper Clinch River Watershed.

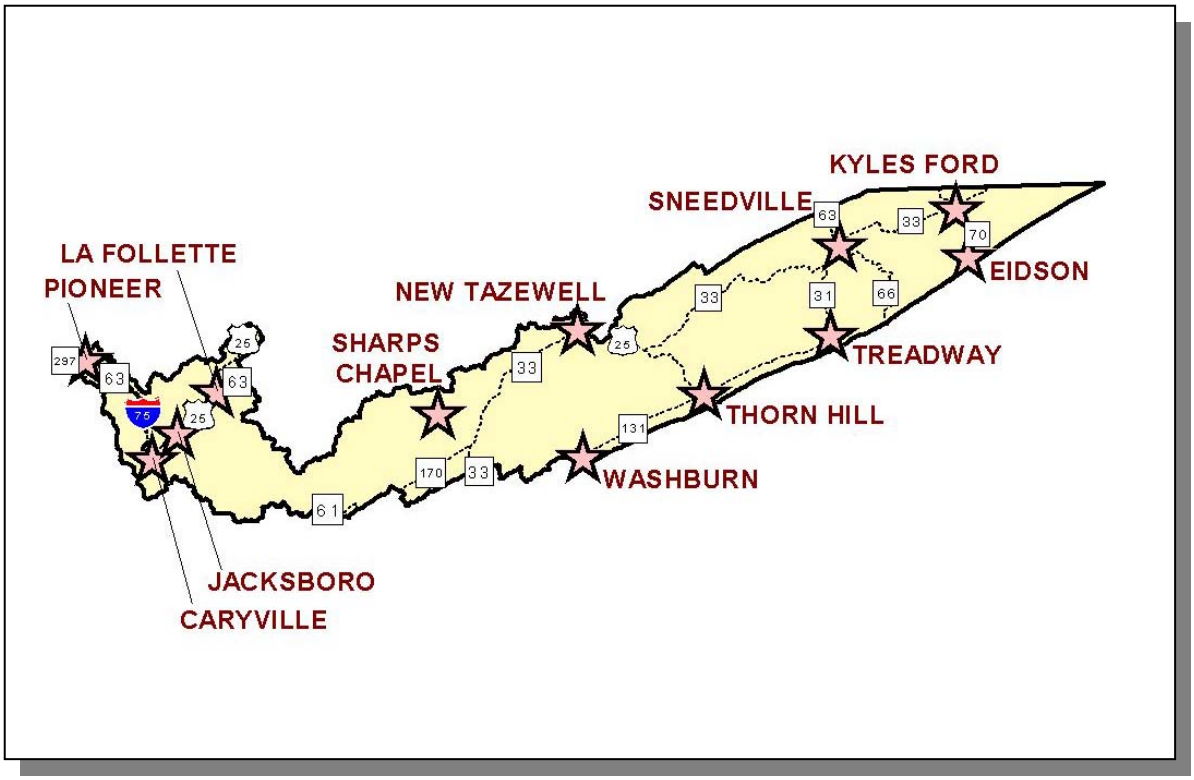


Figure 2-2. Communities and Roads in the Tennessee Portion of the Upper Clinch River Watershed.

MUNICIPALITY	POPULATION	COUNTY
LaFollette	3,885	Campbell
New Tazewell	2,871	Claiborne
Caryville	2,258	Campbell
Jacksboro*	1,887	Campbell
Sneedville*	1,351	Hancock

Table 2-2. Municipalities in the Tennessee Portion of the Upper Clinch River Watershed. *Population based on 2000 census (Tennessee Blue Book) or http://www.hometownlocator.com. Asterisk (*) indicates county seat.*

2.3. GENERAL HYDROLOGIC DESCRIPTION.

2.3.A. Hydrology. The Upper Clinch River Watershed, designated 06010205 by the USGS, is approximately 1,944 square miles (709 square miles in Tennessee) and drains to the Tennessee River.

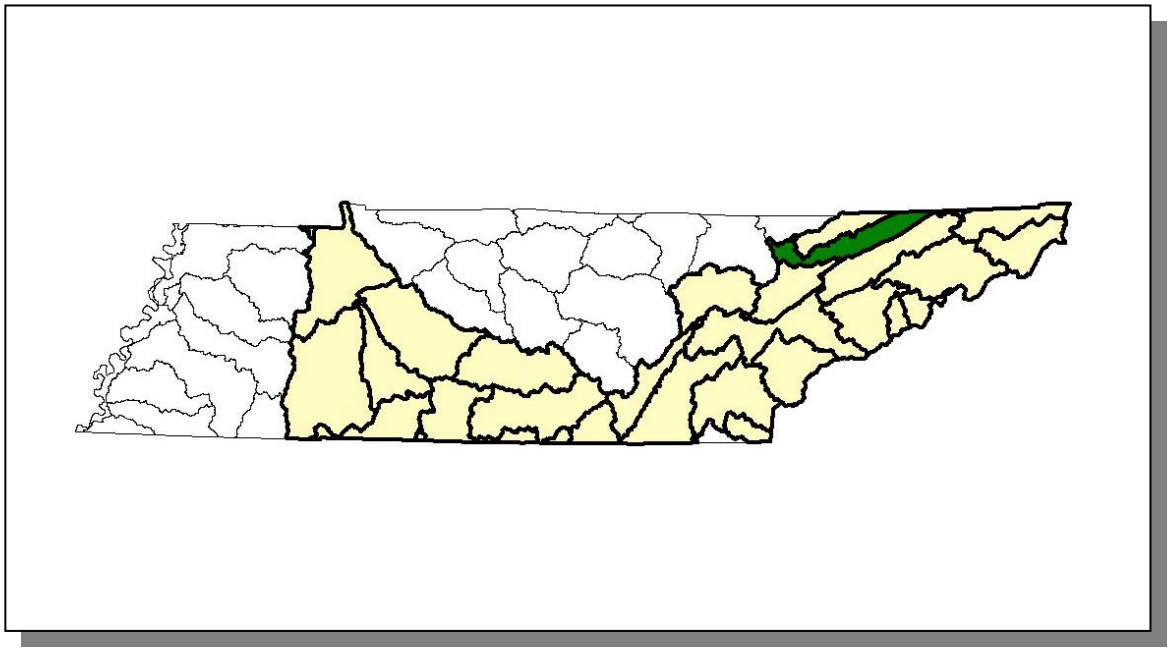


Figure 2-3. The Upper Clinch River Watershed is Part of the Tennessee River Basin.

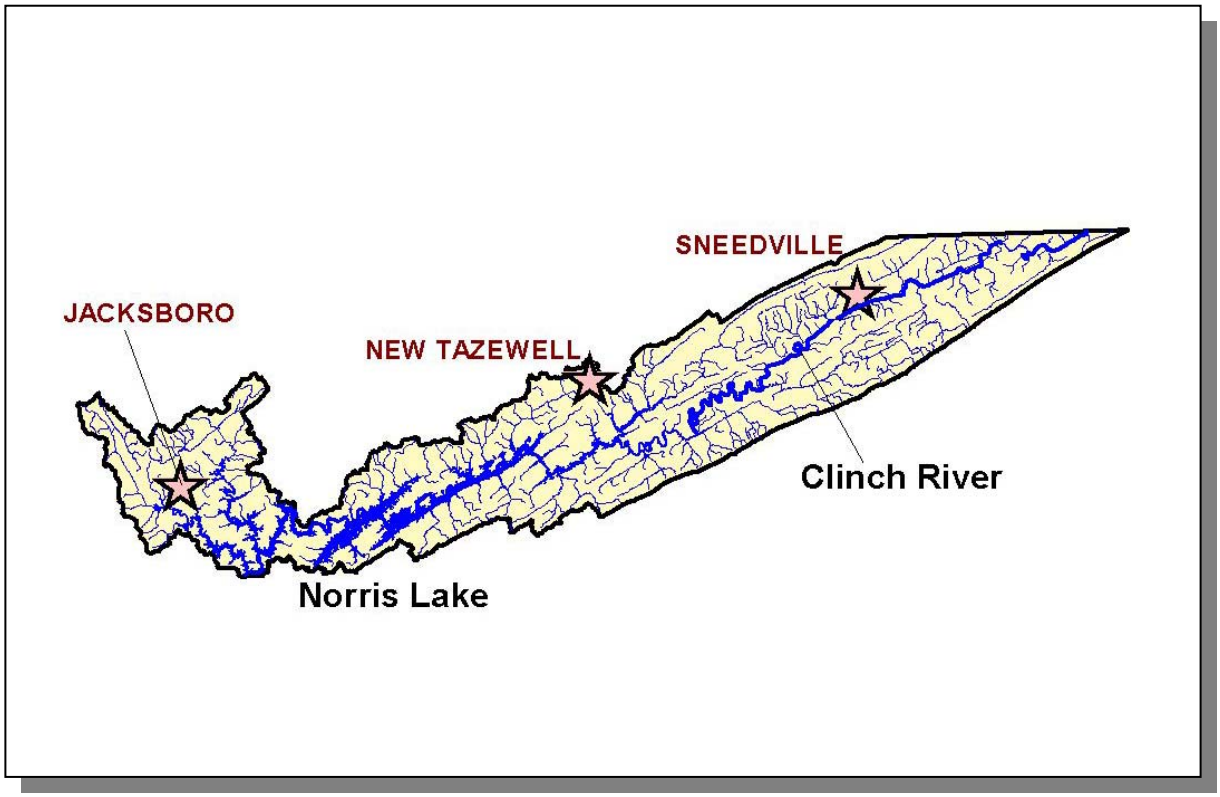


Figure 2-4. Hydrology in the Tennessee Portion of the Upper Clinch River Watershed. *There are 757.1 stream miles and 34,681 lake acres recorded in River Reach File 3 in the Tennessee portion of the Upper Clinch River Watershed. Location of the Clinch River including Norris Lake, and the cities of Jacksboro, New Tazewell, and Sneedville are shown for reference.*

2.3.B. Dams. There are 7 dams inventoried by TDEC Division of Water Supply in the Tennessee portion of the Upper Clinch River Watershed. These dams either retain 30 acre-feet of water or have structures at least 20 feet high.

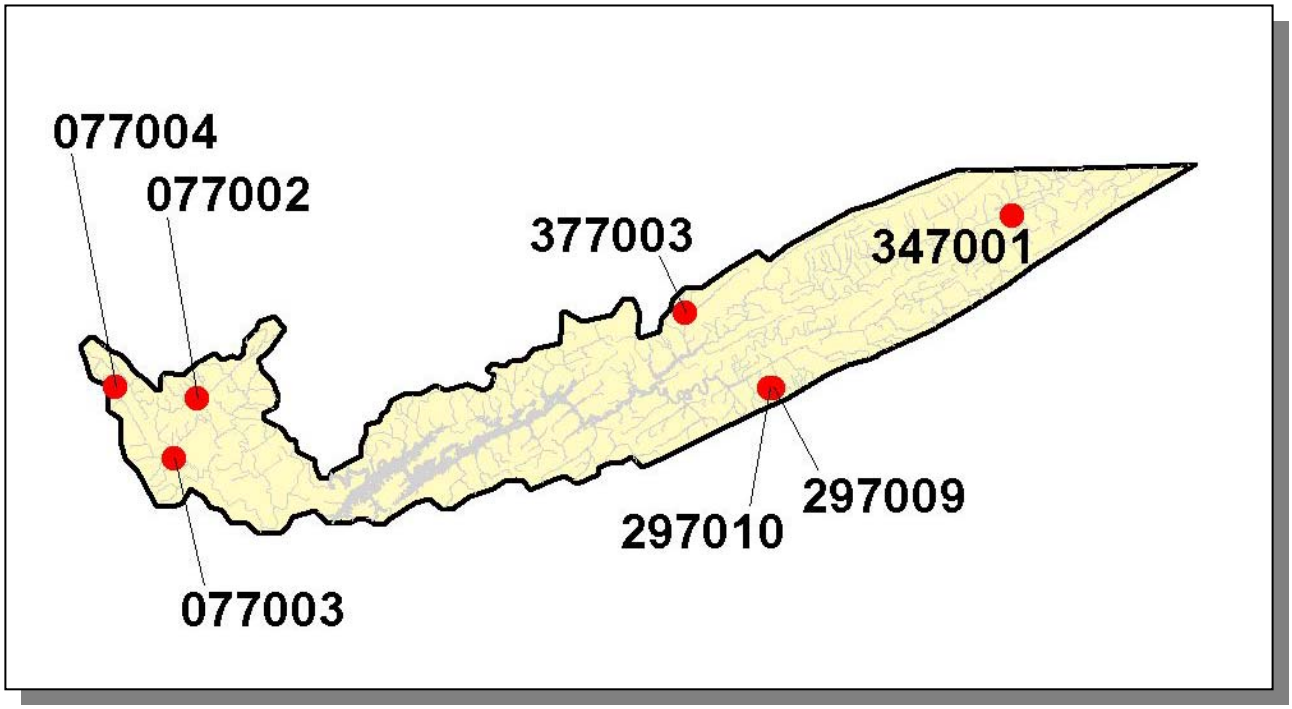


Figure 2-5. Location of Inventoried Dams in the Tennessee Portion of the Upper Clinch River Watershed. *More information is provided in Appendix II and at http://gwidc.memphis.edu/website/dws/.*

2.4. LAND USE. Land Use/Land Cover information was provided by EPA Region 4 and was interpreted from 1992 Multi-Resolution Land Cover (MRLC) satellite imagery.

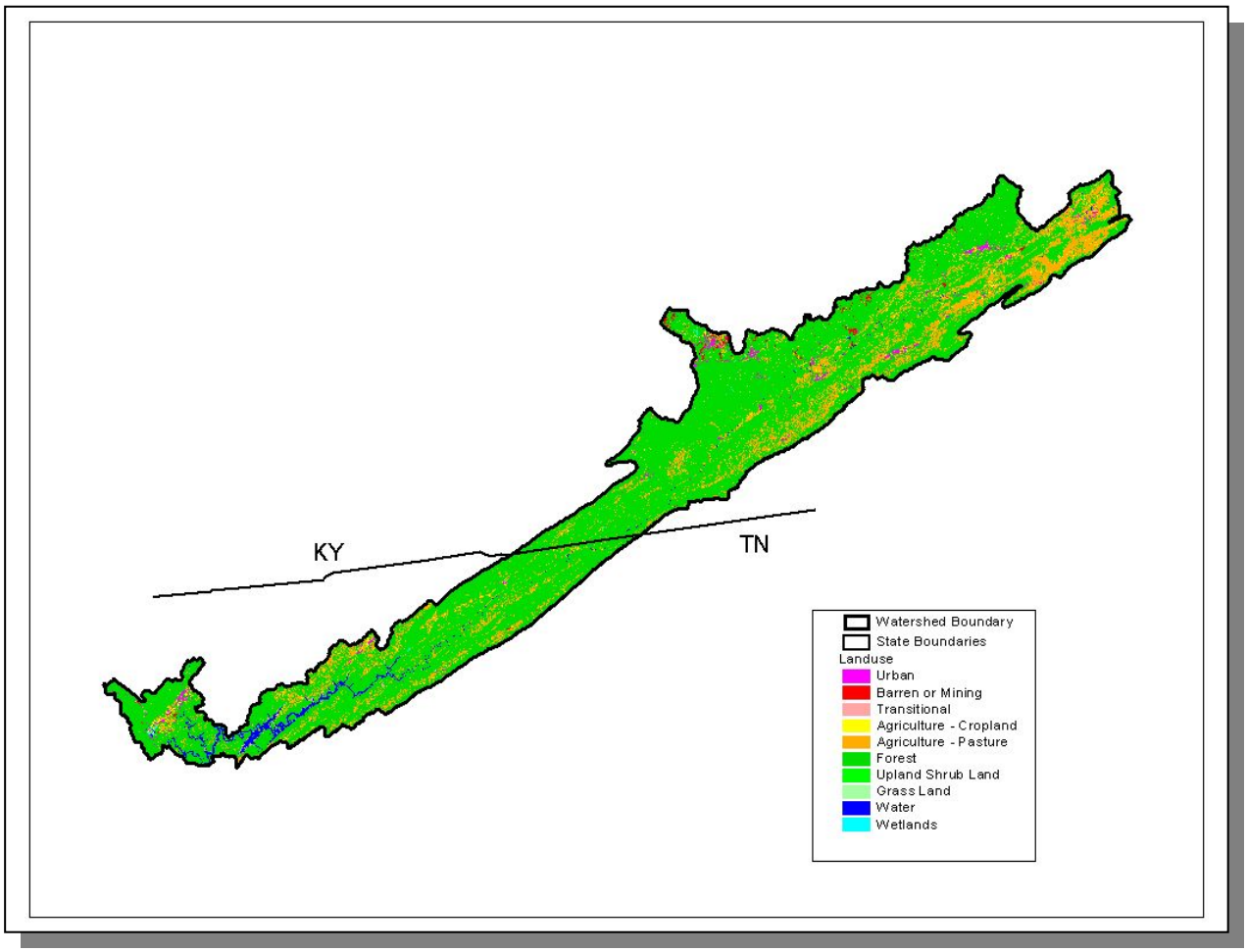


Figure 2-6. Illustration of Select Land Cover/Land Use Data from MRLC Satellite Imagery.

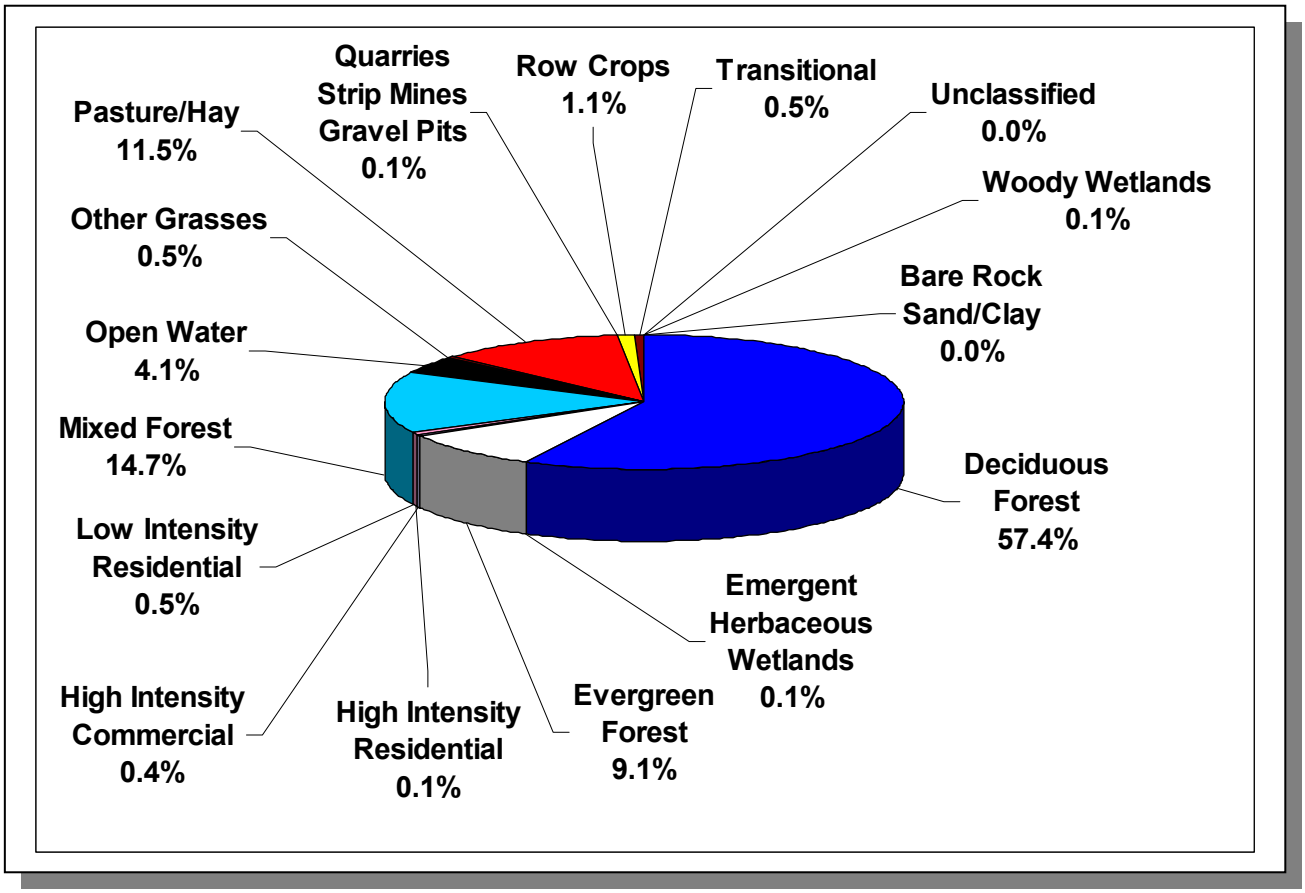


Figure 2-7. Land Use Distribution in the Tennessee Portion of the Upper Clinch River Watershed. *More information is provided in Appendix II.*

Sinkholes, springs, disappearing streams and caves characterize karst topography. The term "karst" describes a distinctive landform that indicates dissolution of underlying soluble rocks by surface water or ground water. Although commonly associated with limestone and dolomite (carbonate rocks), other highly soluble rocks such as gypsum and rock salt can be sculpted into karst terrain. In karst areas, the ground water flows through solution-enlarged channels, bedding planes and microfractures within the rock. The characteristic landforms of karst regions are: closed depressions of various size and arrangement; disrupted surface drainage; and caves and underground drainage systems. The term "karst" is named after a famous region in the former country of Yugoslavia.

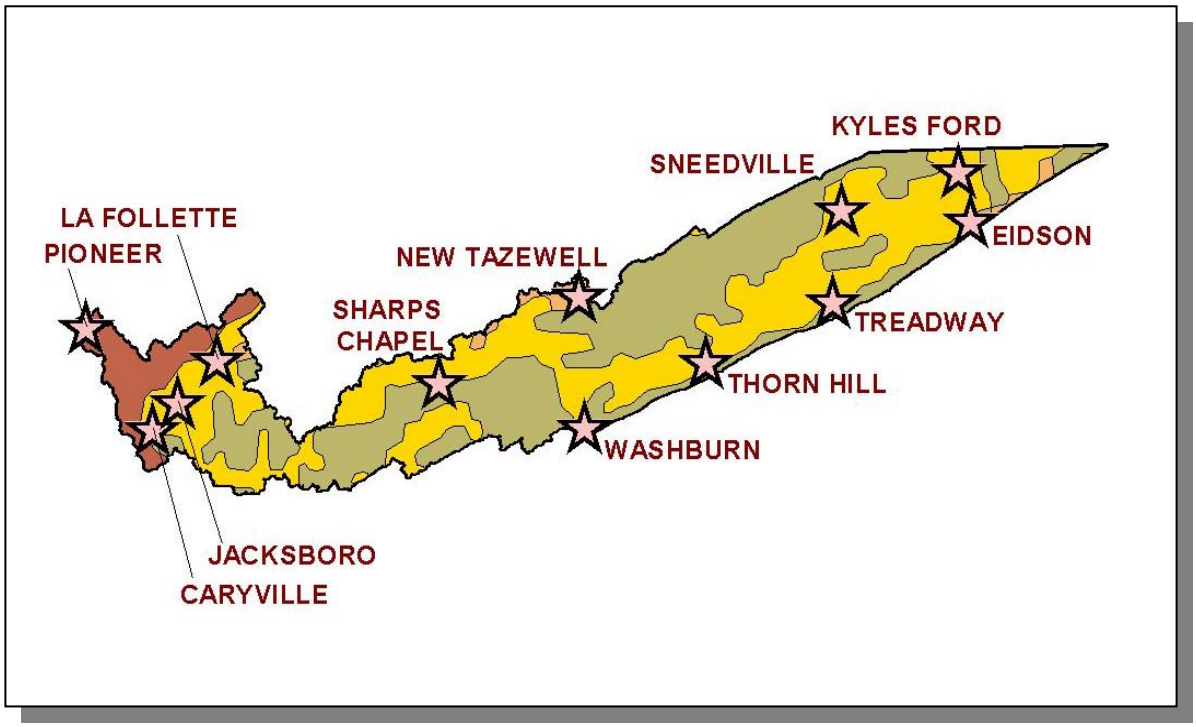


Figure 2-8. Illustration of Karst Areas in the Tennessee Portion of the Upper Clinch River Watershed. *Locations of communities in the watershed are shown for reference.*

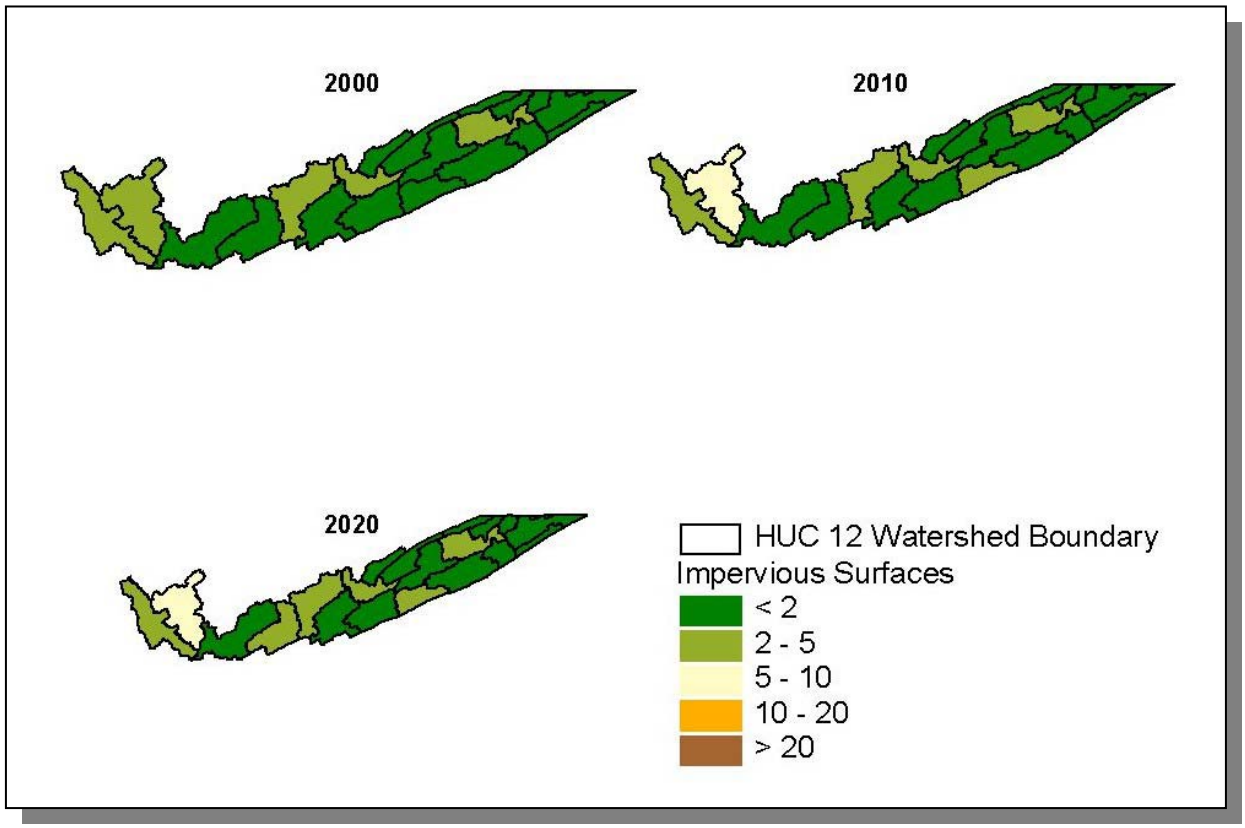


Figure 2-9. Illustration of Total Impervious Area in the Tennessee Portion of the Upper Clinch River Watershed. *All HUC-12 subwatersheds are shown. Current and projected total impervious cover is provided by EPA Region 4. More information can be found at: http://www.epa.gov/ATHENS/research/impervious/*

2.5. ECOREGIONS AND REFERENCE STREAMS. Ecoregions are relatively homogeneous areas of similar geography, topography, climate and soils that support similar plant and animal life. Ecoregions serve as a spatial framework for the assessment, management, and monitoring of ecosystems and ecosystem components. Ecoregion studies can aid the selection of regional stream reference sites, identifying high quality waters, and developing ecoregion-specific chemical and biological water quality criteria.

There are eight Level III Ecoregions and twenty-five Level IV subecoregions in Tennessee. The Tennessee portion of the Upper Clinch River Watershed lies within 2 Level III ecoregions (Ridge and Valley and Central Appalachians) and contains 4 Level IV subecoregions:

- The **Southern Limestone / Dolomite Valleys and Low Rolling Hills (67f)** form a heterogeneous region composed predominantly of limestone and cherty dolomite. Landforms are mostly low rolling ridges and valleys, and the solids vary in their productivity. Landcover includes intensive agriculture, urban and industrial, or areas of thick forest. White oak forests, bottomland oak forests, and sycamore-ash-elm riparian forests are the common forest types, and grassland barrens intermixed with cedar-pine glades also occur here.

- The **Southern Sandstone Ridges (67h)** ecoregion encompasses the major sandstone ridges, but these ridges also have areas of shale and siltstone. The steep, forested chemistry of streams flowing down the ridges can vary greatly depending on the geologic material. The higher elevation ridges are in the north, including Wallen Ridge, Powell Mountain, Clinch Mountain, and Bays Mountain. White Oak Mountain in the south has some sandstone on the west side, but abundant shale and limestone as well. Grindstone Mountain, capped by the Gizzard Group sandstone, is the only remnant of Pennsylvanian-age strata in the Ridge and Valley of Tennessee.

- The **Southern Dissected Ridges and Knobs (67i)** contain more crenulated, broken, or hummocky ridges, compared to smoother, more sharply pointed sandstone ridges. Although shale is common, there is a mixture and interbedding of geologic materials. The ridges on the east side of Tennessee's Ridge and Valley tend to be associated with the Ordovician-age Sevier shale, Athens shale, and Holston and Lenoir limestones. These can include calcareous shale, limestone, siltstone, sandstone, and conglomerate. In the central and western part of the ecoregion, the shale ridges are associated with the Cambrian-age Rome Formation: shale and siltstone with beds of sandstone. Chestnut oak forests and pine forests are typical for the higher elevations of the ridges, with areas of white oak, mixed mesophytic forest, and tulip poplar on the lower slopes, knobs, and draws.

- The **Cumberland Mountains (69d)**, in contrast to the sandstone-dominated Cumberland Plateau (68a) to the west and southwest, are more highly dissected, with narrow-crested steep slopes, and younger Pennsylvanian-age shales, sandstones, siltstones, and coal. Narrow, winding valleys separate

the mountain ridges, and relief is often 2000 feet. Cross Mountain, west of Lake City, reaches 3534 feet in elevation. Soils are generally well-drained, loamy, and acidic, with low fertility. The natural vegetation is a mixed mesophytic forest, although composition and abundance vary greatly depending on aspect, slope position, and degree of shading from adjacent land masses. Large tracts of land are owned by lumber and coal companies, and there are many areas of stripmining.

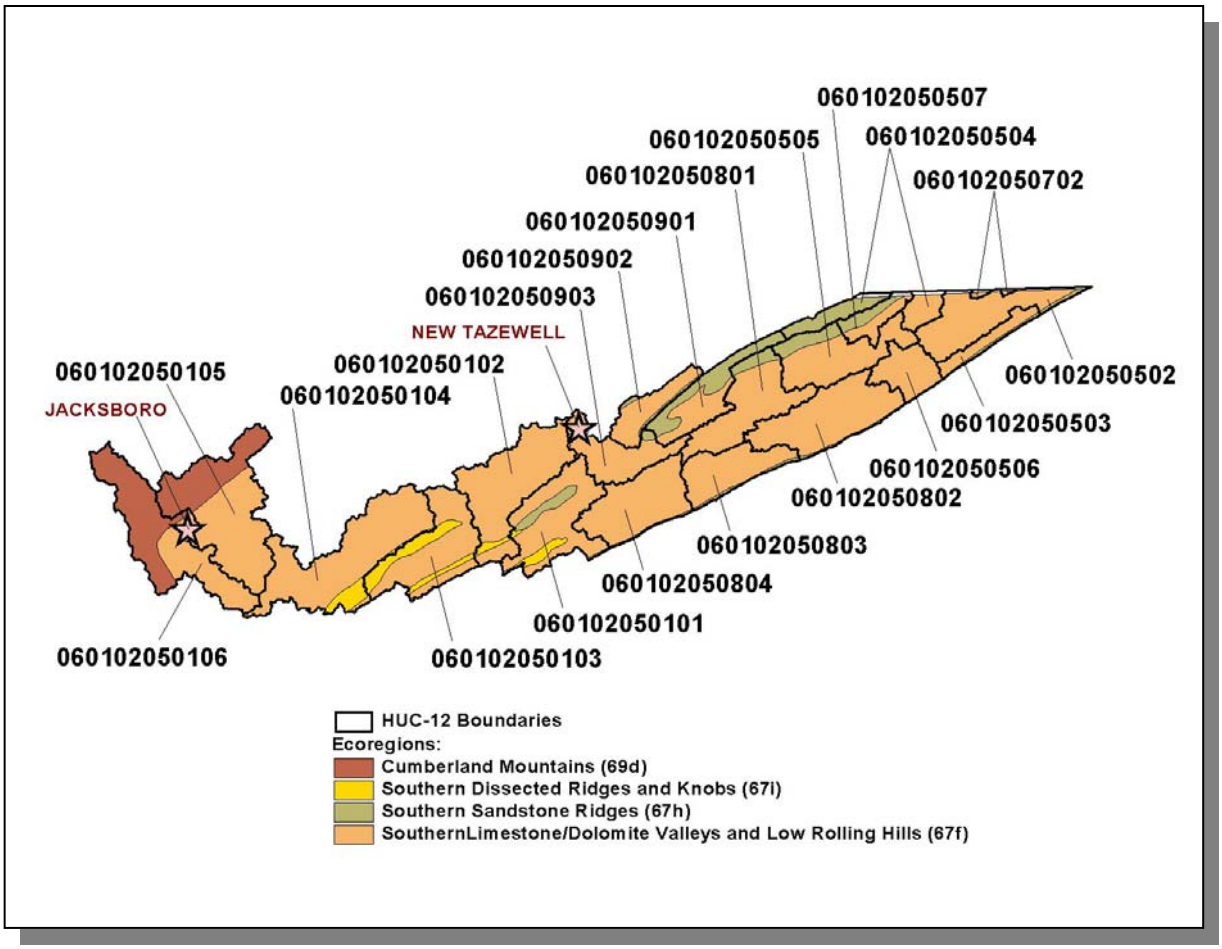


Figure 2-10. Level IV Ecoregions in the Tennessee Portion of the Upper Clinch River Watershed. *Locations of Jacksboro and New Tazewell are shown for reference.*

Each Level IV Ecoregion has at least one reference stream associated with it. A reference stream represents a least impacted condition and may not be representative of a pristine condition.

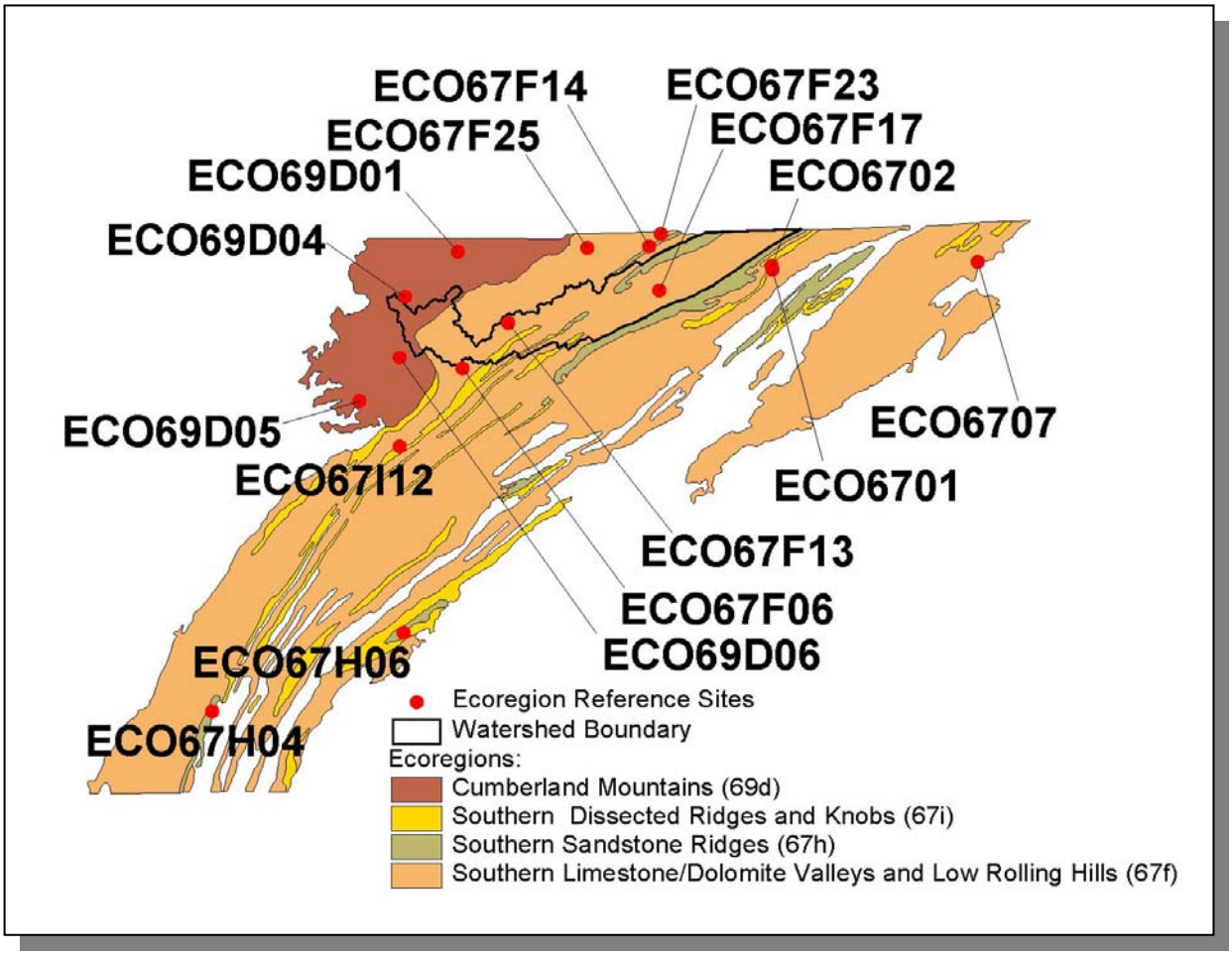


Figure 2-11. Ecoregion Monitoring Sites in Level IV Ecoregions 67f, 67h, 67i, and 69d. *The Tennessee portion of the Upper Clinch River Watershed is shown for reference. More information, including which ecoregion reference sites were inactive or dropped prior to 01/01/2006, is provided in Appendix II.*

2.6. NATURAL RESOURCES.

2.6.A. Rare Plants and Animals. The Heritage Program in the TDEC Division of Natural Heritage maintains a database of rare species that is shared by partners at The Nature Conservancy, Tennessee Wildlife Resources Agency, the US Fish and Wildlife Service, and the Tennessee Valley Authority. The information is used to: 1) track the occurrence of rare species in order to accomplish the goals of site conservation planning and protection of biological diversity, 2) identify the need for, and status of, recovery plans, and 3) conduct environmental reviews in compliance with the federal Endangered Species Act.

GROUPING	NUMBER OF RARE SPECIES
Insects and Spiders	4
Mussels	20
Snails	2
Amphibians	4
Birds	4
Fish	14
Mammals	11
Plants	22
Total	**81**

Table 2-3. There are 81 Known Rare Plant and Animal Species in the Tennessee Portion of the Upper Clinch River Watershed.

In the Tennessee portion of the Upper Clinch River Watershed, there are fourteen known rare fish species, twenty known rare mussel species, and two known rare snail species.

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS
Acipenser fulvescens	Lake sturgeon		E
Carpiodes velifer	Highfin carpsucker		D
Cycleptus elongates	Blue sucker		T
Cyprinella monacha	Spotfin chub	LT	T
Erimystax cahni	Slender chub	LT	T
Eteostoma cinereum	Ashy darter		T
Etheostoma denocourti	Golden darter		
Etheostoma Tippecanoe	Tippecanoe darter		D
Notropus albizonatus	Palezone shiner	LE	E
Noturus flavipinnis	Yellowfin madtom		E
Noturus stanauli	Pygmy madtom	LE	E
Percina aurantiaca	Tangerine darter		D
Percina burtoni	Blotchside darter		D
Phoxinus tennesseensis	Tennessee dace		D
Conradilla caelata	Birdwing pearlymussel	LE	E
Cumberlandia monodonta	Spectaclecase		
Cyprogenia irrorata	Eastern fanshell pearlymussel	LE	E
Dromus dromas	Dromedary pearlymussel	LE	E
Epioblasma brevidens	Cumberlandian combshell	LE	E
Epioblasma capsaeformis	Oyster mussel	LE	E
Epioblasma triquerta	Snuffbox		
Fusconaia cuneolus	Fine-rayed pigtoe	LE	E
Fusconaia edgariana	Shiny pigtoe	LE	E
Hemistena lata	Cracking pearlymussel	LE	E
Lampsilis abrupta	Pink mucket	LE	E
Lexingtonia dolabelloides	Slabside pearlymussel	C	
Obovaria subrotunda	Round hickorynut		
Plethobasus cyphyus	Sheepnose		
Pleurobema oviforme	Tennessee clubshell		
Pleurobema plenum	Rough pigtoe	LE	E
Pleurobema rubrum	Pyramid pigtoe		
Ptychobranchus subtentum	Fluted kidneyshell	C	
Quadrula cylindrica strigillata	Rough rabbitsfoot pearlymussel		
Villosa perpurpurea	Purple bean	LE	E
Anthearnia anthonyi	Anthony's riversnail	LE	E
Io fluvialis	Spiny riversnail		

Table 2-4. Rare Aquatic Species in the Collins River Watershed. *Federal Status: LE, Listed Endangered by the U.S. Fish and Wildlife Service; LT, Listed Threatened by the U.S. Fish and Wildlife Service; C, Candidate species for listing by the U.S. Fish and Wildlife Service. State Status: E, Listed Endangered by the Tennessee Wildlife Resources Agency; T, Listed Threatened by the Tennessee Wildlife Resources Agency D; Deemed in Need of Management by the Tennessee Wildlife Resources Agency. More information may be found at http://www.state.tn.us/environment/na/.*

2.6.B. Wetlands. The Division of Natural Heritage maintains a database of wetland records in Tennessee. These records are a compilation of field data from wetland sites inventoried by various state and federal agencies. Maintaining this database is part of Tennessee's Wetland Strategy, which is described at:

http://www.state.tn.us/environment/nh/wetlands/

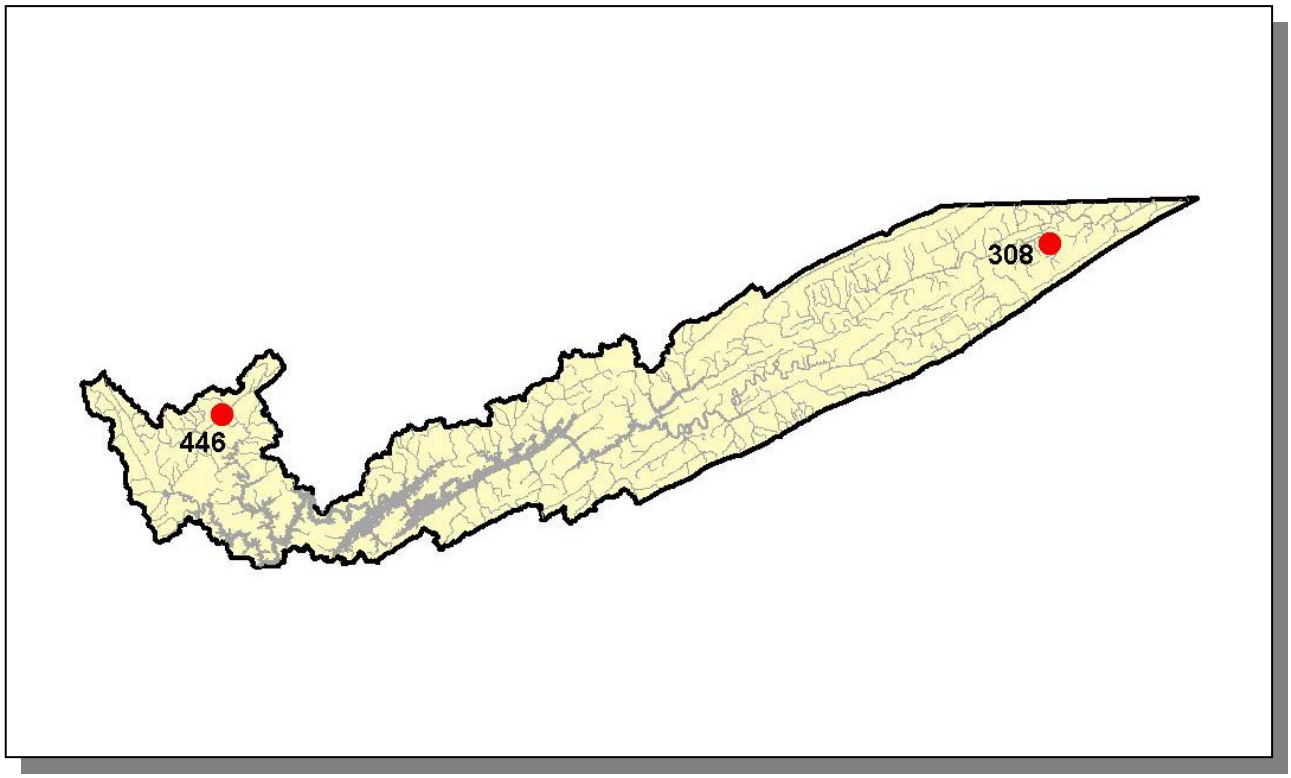


Figure 2-12. Location of Wetland Sites in TDEC Division of Natural Heritage Database in the Tennessee Portion of the Upper Clinch River Watershed. ***This map represents an incomplete inventory and should not be considered a dependable indicator of the presence of wetlands.*** *There may be additional wetland sites in the watershed. More information is provided in Appendix II.*

2.7. CULTURAL RESOURCES.

2.7.A. Nationwide Rivers Inventory. The Nationwide Rivers Inventory, required under the Federal Wild and Scenic Rivers Act of 1968, is a listing of free-flowing rivers that are believed to possess one or more outstanding natural or cultural values. Exceptional scenery, fishing or boating, unusual geologic formations, rare plant and animal life, cultural or historic artifacts that are judged to be of more than local or regional significance are the values that qualify a river segment for listing. The Tennessee Department of Environment and Conservation and the Rivers and Trails Conservation Assistance branch of the National Park Service jointly compile the Nationwide Rivers Inventory from time to time (most recently in 1997). Under a 1980 directive from the President's Council on Environmental Quality, all Federal agencies must seek to avoid or mitigate actions that would have an adverse effect on Nationwide Rivers Inventory segments.

The most recent version of the Nationwide Rivers Inventory lists portions of one stream in the Tennessee portion of the Upper Clinch River Watershed:

> Clinch River (RM 130 to RM 156) has numerous archaeological sites, long shallow shoal areas, and deep pools. The upper reach provides for an excellent pastoral float and has habitat for the most diverse mussel fauna in the world.

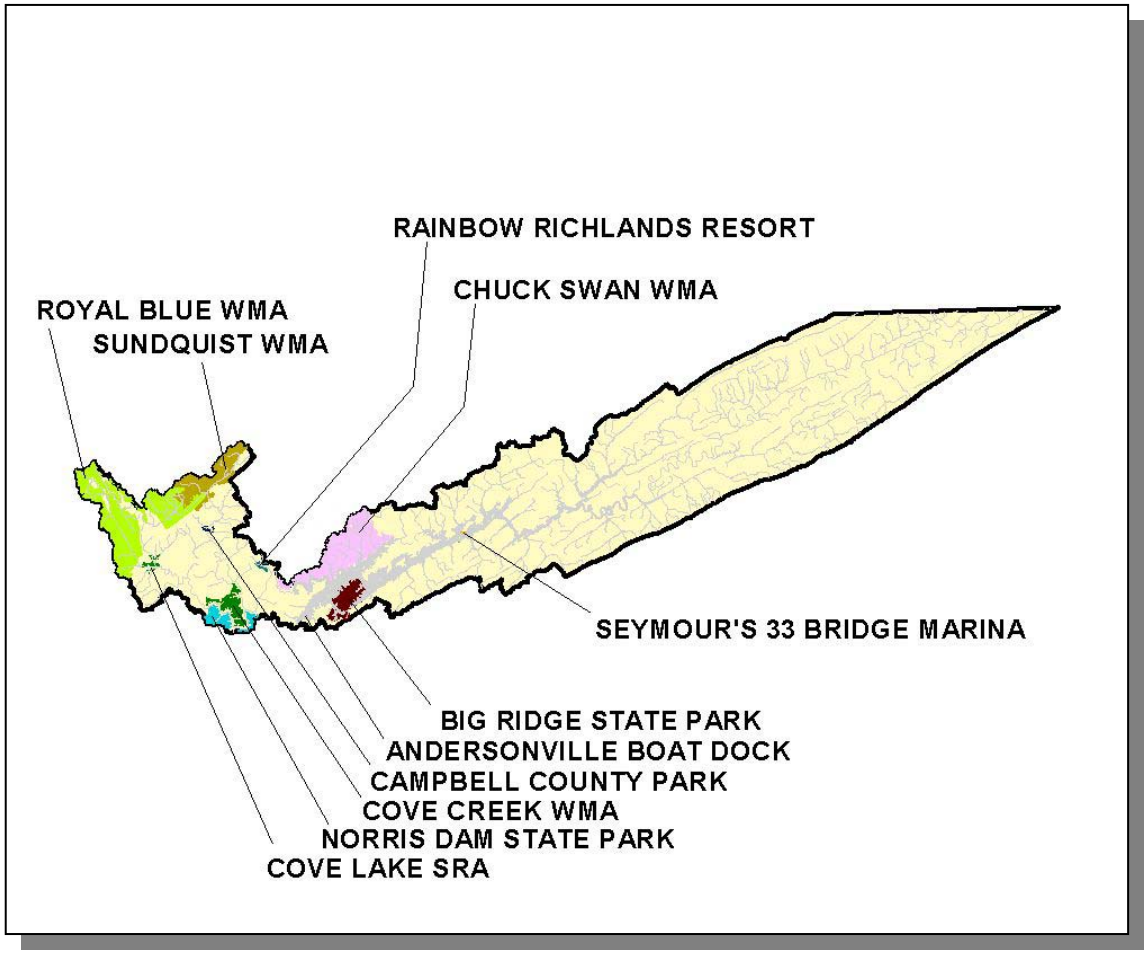
RIVER	SCENIC	RECREATION	GEOLOGIC	FISH	WILDLIFE
Clinch River	X	X	X	X	X

Table 2-5. Attributes of Streams Listed in the Nationwide Rivers Inventory.

Additional information may be found online at http://www.ncrc.nps.gov/rtca/nri/

2.7.B. Public Lands. Some sites representative of the cultural heritage are under state or federal protection:

- Andersonville Boat Dock is located on Norris Lake. More information may be found at http://www.andersonvilleboatdock.com/.
- Big Ridge State Park is a 3,687-acre park located in Maynardville. More information about Big Ridge State Park may be found at http://www.state.tn.us/environment/parks/parks/BigRidge/index.php.
- Campbell County Park is located in Jacksboro.
- Chuck Swan Wildlife Management Area is a 26,000-acre property managed by TWRA in the northwest portion of Union county.
- Cove Creek Wildlife Management Area is a 2,450-acre area managed by TWRA in Campbell County.
- Cove Lake State Recreation Area is a 673-acre state park located in Campbell County. More information may be found at http://www.state.tn.us/environment/parks/parks/CoveLake.
- Norris Dam State Park is a 4,038-acre state park located in Lake City. More information about the park may be found at http://www.state.tn.us/environment/parks/parks/NorrisDam.
- Rainbow Richlands Resort is a 384-acre resort in Campbell County.
- Royal Blue Wildlife Management is a 50,000-acre area managed by TWRA in Campbell and Scott Counties.
- Sundquist Wildlife Management Area is a 73,000-acre area managed by TWRA in Anderson, Campbell, and Scott Counties.



igure 2-12. Public Lands in the Tennessee Portion of the Upper Clinch River Watershed. *Data are from Tennessee Wildlife Resources Agency. SRA, State Recreation Area; WMA, Wildlife Management Area.*

2.8. TENNESSEE RIVERS ASSESSMENT PROJECT. The Tennessee Rivers Assessment is part of a national program operating under the guidance of the National Park Service's Rivers and Trails Conservation Assistance Program. The Assessment is an inventory of river resources, and should not be confused with "Assessment" as defined by the Environmental Protection Agency. A more complete description can be found in the Tennessee Rivers Assessment Summary Report, which is available from the Department of Environment and Conservation and on the web at:

http://www.state.tn.us/environment/wpc/publications/riv/

STREAM	NSQ	RB	RF	STREAM	NSQ	RB	RF
Ball Creek	1		1	North Fork Clinch River	2		2
Big barren Creek	4			Ollis Creek			
Big Creek	3			Puncheon Camp Creek	3		1
Big War Creek			2	Richardson Creek	3		1
Blackwater creek	2			Sweet Creek	2		
Clinch River	1	2	2	Sycamore Creek	2		
Cove Creek	4			War Creek	3		
Indian Creek	3			Williams creek	3		

Table 2-6. Stream Scoring from the Tennessee Rivers Assessment Project.

Categories: NSQ, Natural and Scenic Qualities
RB, Recreational Boating
RF, Recreational Fishing

Scores: 1. Statewide or greater Significance; Excellent Fishery
2. Regional Significance; Good Fishery
3. Local Significance; Fair Fishery
4. Not a significant Resource; Not Assessed